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EXAMINER
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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

Paper No. 22

Application Number: 09/233,073  
Filing Date: January 19, 1999  
Appellant(s): NANBU ET AL.

Dennis C. Rodgers  
For Appellant

**MAILED**  
**OCT 23 2001**  
**GROUP 1700**

EXAMINER'S ANSWER

This is in response to appellant's brief on appeal filed 8/13/2001.

**(1) *Real Party in Interest***

A statement identifying the real party in interest is contained in the brief.

**(2) *Related Appeals and Interferences***

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

**(3) *Status of Claims***

The statement of the status of the claims contained in the brief is correct.

**(4) *Status of Amendments After Final***

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) *Summary of Invention***

The summary of invention contained in the brief is correct.

**(6) *Issues***

The appellant's statement of the issues in the brief is correct.

**(7) *Grouping of Claims***

Appellant has grouped the claims thusly:

Group I - claims 1-6 and 11-13

Group II - claims 7, 8 and 14

Group III – claims 9, 10

and has stated that the claims of Group III-II do not fall together and are separately patentable. However, appellant has no reason to support the position that claims of Group III ( claims 9, 10 ) are separately patentable from claims of Group II ( claims 7, 8 and 14 ). In addition, claims 9, 10, reciting the limitation of " a flow of

Art Unit: 1765

etchant provided at a flow rate which produces a flow diverging position that is internal to an outer periphery of an object being etched" which have already been recited in claims 7 and 8. Therefore claims 9, 10 are grouped along with claims 7, 8 and 14.

For the purpose of this appeal, the claims are grouped thusly:

Group I - claims 1-6 and 11-13

Group II - claims 7, 8, 9, 10 and 14

**(8) *Claims Appealed***

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(9) *Prior Art of Record***

5,556,501 ✓	COLLINS ET AL.	9-1996
5,338,398 ✓	SZWEJKOWSKI ET AL.	8-1994
5,792,272 ✓	VAN OS ET AL.	8-1998

**(10) *Grounds of Rejection***

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-6, 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Collins et al. ( US 5,556,501) in view of Szwejkowski et al ( US 5,338,398 )

Collins discloses an etching method using a plasma reactor chamber having an inductively coupled antenna driven by RF energy for etching metals. This etching method comprises the steps of:

supplying etching gas through a main gas inlet manifold into the internal vacuum processing chamber ( col 7, lines 55-59 )

developing an etching plasma upon application of RF energy supplied by a coil to the etching gas in the processing chamber ( col 7, lines 62-65 ) reads on a plasma producing step of producing radicals in the plasma producing chamber by converting the etching gas into a plasma by applying RF power to the etching gas

etching polysilicon on silicon wafer in the processing chamber 16B connected to the plasma source chamber 16A by flowing gas/radicals from the plasma source chamber toward the wafer located in the chamber ( col 22, lines 45-46 ; col 8, lines 16-18 and fig. 1) evacuating the chamber to a pressure in the range of 0.1 mTorr to 200 mTorr (col 7, lines 39-41 and col 9, lines 40-41 )

supplying etching gas of Chlorine at a flow rate of 50 cc to the processing chamber to etch polysilicon film ( col 22, lines 45-48 )

Collins differs from the instant claimed invention as per claim 1 by supplying etching gas of Chlorine at a flow rate of 50 cc instead of 8.4 sccm or above for a substantial volume of one liter of the processing chamber.

However, Szejewski discloses a process for RIE etching/plasma etching a polysilicon film in a vacuum chamber using Chlorine at a flow rate of from about 40-100 sccm into a 3 liter processing chamber (  $40 \text{ sccm} / 3 \text{ liter} = 13.3 \text{ sccm /liter}$  within the claimed range of 8.4 sccm to 16.9 scm for a substantially volume of one liter ) ( col 4, lines 19-22 )

Hence, one skilled in the art would have found it obvious to modify Collins's etching gas flow rate by using the etching gas flow rate as taught by Szejewski because Szejewski states that using the gaseous components/ gas flow rate of his

Art Unit: 1765

invention will not result in the undesirable formation of particles on the wafer surface and will not condense at room temperature in the lines used to bring the etchant gases to the vacuum etching chamber ( col 5, lines 49-54 )

Claims 7-10, 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Collins et al. ( US 5,556,501 ) in view of Szwejkowski et al ( US 5,338,398 ) and further in view of van Os et al. ( US 5,792,272 )

Collins and Szwejkowski have been described above. Unlike the instant claimed inventions as per claims 7-10, Collins and Szwejkowski do not disclose providing a flow rate of the etchant which produce a flow diverging position that is substantially at or internal to the outer periphery of an object (wafer) being etched

Van Os discloses a plasma etching method to produce gas/etchant flow diverging position at internal location to the outer periphery of the wafer ( col 4, lines 3-20, fig. 6 in Van Os shows etchant flow pattern diverges at positions that is internal to the outer periphery of wafer 24 )

Hence, one skilled in the art would have found it obvious to modify Collins and Szwejkowski by providing a flow rate of etchant to produce a gas flow diverging position with respect to the outer periphery of the wafer as per Van Os in order to achieve uniform concentration of etchant and promote uniform etching across the wafer ( col 10, lines 10-12 )

#### **(11) Response to Argument**

In response to applicant's argument that there is no suggestion to combine the flow rate of Szwejkowski et al. with the system of Collins et al., the examiner

Art Unit: 1765

recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, since Szwejkowski teaches a method of plasma etching using the same etchant gas ( Chlorine ) flow rate as the claimed invention (8.4 sccm to 16.9 scm for a substantially volume of one liter ) and disclose that his gaseous component will not result in the undesirable formation of particles on the wafer surface and will not condense at room temperature in the lines used to bring the etchant gases to the etch chamber ( col 5, lines 50-54 ) and Collins is also directed to a plasma etching method using Chlorine ( col 22, lines 46-47 ), one skilled in the art would have found it obvious to employ Szwejkowski's etchant flow rate in Collins etching method especially when motivated by the result of Szwejkowski invention as mentioned above.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon hindsight reasoning because the method and system of Collins et al. and Szwejkowski et al. are so different , it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a

Art Unit: 1765

reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). First at all, the examiner notes that the applicants argue that because the plasma of the two teaching are generated at different locations and different manners, the etchant gas would be exposed to substantially different flow conditions and flow characteristics in these two systems. This statement is made without any factual basis. While it is true that the plasma of the two teaching are generated at different locations and different manners, applicants have ignored the fact that both references are directed to plasma etching method using the same etchant (Chlorine) to etch the same material (polysilicon) in the chamber having the same low pressure as the instant claimed invention. One skilled in the art would have found it obvious to reconstruct the instant claimed invention by employing Szejewski's higher etchant gas flow rate in the system of Collins especially since Collins also discloses etching the polysilicon using Chlorine at high pressure (col 22, lines 46-47) and suggesting that higher gas flow rate is preferred at high pressure (col 9, lines 43-45), in contrast with the applicants statement that nothing in either Collins indicates that higher etchant gas flow might be used in the system of Collins.

In page 22 of the brief, applicants argue that because the cited motivation of "to promote uniform etching across the wafer", used to combine Collins, Szejewski and Van Os, could only be derived from the applicant's own specification and that the rejection is improper. However, the examiner notes that Van Os also teaches "providing symmetrical flow of gases within the reactor and particularly to promote uniform etching across the wafer" (col 10, lines 10-12). Since the motivation to


Art Unit: 1765

combine the reference was found in the reference , the examiner asserts that the rejection is proper.

In page 27 of the brief, applicants argue that Van Os et al is entirely silent concerning a flow diverging position because Van Os et al do not depict in Fig. 6, nor do they described a flow diverging position. Applicant's argument is not persuasive because Fig. 6 in Van Os clearly shows etchant flow line/pattern diverge at positions that is internal or to the outer periphery of wafer 24. The examiner maintains that Van Os is not silent regarding of a flow diverging position.


For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

  
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October 19, 2001

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